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HANDBOOK ON SANITATION OF RAILROAD PASSENGER CAR CONSTRUCTION. STANDARDS OF SANITATION APPLICABLE TO THE CONSTRUCTION OF RAILROAD PASSENGER AND DINING CARS. REVISION

Public Health Service
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HANDBOOK ON SANITATION OF

Railroad Passenger Car Construction

1959 Revision

STANDARDS OF SANITATION
APPLICABLE TO THE CONSTRUCTION OF
RAILROAD PASSENGER AND DINING CARS

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
Public Health Service
Bureau of State Services
Division of Engineering Services
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Related Publications:

Dining Cars in Operation
(PHS Pub. No. 83)

Railroad Servicing Areas
(PHS Pub. No. 66)

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FOREWORD

It is generally recognized that sound sanitation practices are an important factor in good service, and that healthful, safe, and enjoyable travel is a product of good service and the proper installation and use of equipment. It is more practical, too, to "build in" facilities which will permit the practice of sound sanitation principles than it is to make costly changes later.

Therefore, with the object of prescribing the application of sound sanitary principles to the construction of railroad passenger cars, this handbook has been prepared by the Interstate Carrier Section, General Engineering Program, of the Division of Sanitary Engineering Services, Public Health Service, for use by railroad personnel, car builders, suppliers of railroad equipment, and Public Health Service personnel. This is one of a set of three handbooks related to railroad sanitation. One of these, "Dining Cars in Operation," sets forth sanitation standards for operation. Another, "Railroad Servicing Areas," is concerned with sanitation in the yard or station, or wherever water, food, or milk is loaded, and in those places where wastes are removed from cars.

The principles, or standards, of sanitation appearing in this handbook are intended to serve as a guide to those persons charged with the responsibility of incorporating provisions for sanitary equipment in the design or construction of railroad passenger cars, and the reconstruction of existing cars.

It should be understood at the outset that the standards appearing on the following pages, although not having the legal force of the Interstate Quarantine Regulations, were written with a view to conforming to the intent of those regulations. Compliance with the standards, therefore, will insure compliance with the Interstate Quarantine Regulations and amendments. In the event of noncompliance with a standard, however, and failure to correct the reported condition, final corrective action will be based upon the applicability of the regulation concerned. Amendments to the Interstate Quarantine Regulations were considered in the preparation of this handbook.

Insofar as reference to design, construction, and reconstruction of railroad passenger cars is concerned, this handbook supersedes the "Sanitation Manual for Land and Air Conveyances Operating in Interstate Traffic," Reprint No. 2444, from the Public Health Reports of January 29, 1943.

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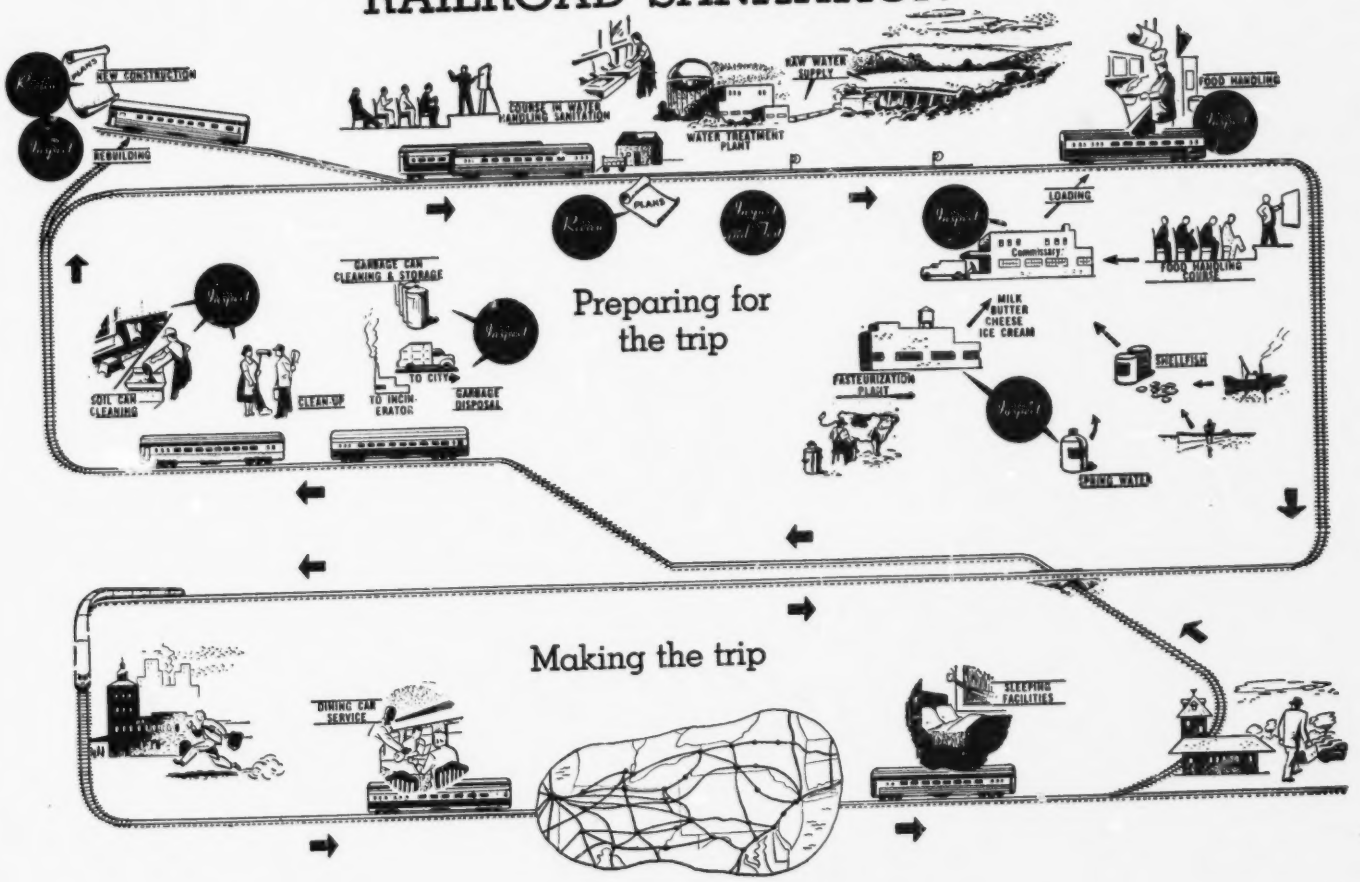
The Joint Committee on Railway Sanitation of the Association of American Railroads and the Association of American Railroad Dining Car Officers have been extremely helpful in reviewing the preliminary draft of this handbook, and their suggestions for improvements have made it possible to produce a more practical handbook than would otherwise have been the case.

Undoubtedly, improved methods and equipment will be developed from time to time. These, in turn, will lead to changes in existing requirements for sanitary practices and procedures. Such developments will be included in supplements to or revisions of this handbook, as circumstances may require.

RAILROAD SANITATION



APPLICABILITY OF THIS HANDBOOK

The standards of sanitation contained in this handbook apply to all new railroad passenger cars to be constructed hereafter. These standards also apply to existing cars on which the sanitation equipment or facilities are hereafter to be replaced or reconstructed.

For the purposes of this handbook, railroad passenger cars are considered to mean all railroad cars on which passengers are transported by an interstate carrier.

An interstate carrier is defined as any company or firm which honors through-bills of lading or tickets that have been issued on an interstate basis, whether or not the conveyances operate on an interstate basis.

LEGAL DEFINITION OF INTERSTATE TRAFFIC:

INTERSTATE QUARANTINE REGULATIONS—SUBPART A—72.1(i):

"The movement of any conveyance or the transportation of persons or property, including any portion of such movement or transportation which is entirely within a State or possession, (1) from a point of origin in any State or possession to a point of destination in any other State or possession, or (2) between a point of origin and a point of destination in the same State or possession but through any other State, possession or contiguous foreign country. Interstate traffic does not include the following: (1) The movement of any conveyance which is solely for the purpose of (i) unloading persons or property transported from a foreign country, or (ii) loading persons or property for transportation to a foreign country. (2) The movement of any conveyance which is solely for the purpose of effecting its repair, reconstruction, rehabilitation or storage."

CONSTRUCTION PLANS

INTERSTATE QUARANTINE REGULATIONS—SUBPART G—SECTION 72.147:

"*Submittal of construction plans:* Plans for the construction or major reconstruction of sanitary equipment or facilities for such conveyances shall be submitted to the Surgeon General for review of the conformity of such plans with the requirements of this subpart, except that submittal of plans shall not be required for any conveyance under reconstruction if the owner or operator thereof has made arrangements satisfactory to the Surgeon General for inspections of such conveyances while under reconstruction for the purpose of determining conformity with those requirements."

Plans (including complete specifications, where available, and drawings) for the construction or major reconstruction of sanitation equipment and facilities on cars on which passengers are to be transported should be submitted to the Public Health Service for review. However, in cases where plans are not normally prepared for reconstruction work, arrangements may be made with a representative of the Public Health Service to

discuss changes before construction begins and to inspect conveyances while they are under construction in lieu of plan submittal.

Although the carrier is responsible for submitting plans, he may request the builder to submit them. Plans generally should be sent to the appropriate Public Health Service regional engineer. In the case of plan submittal directly by car builders, the appropriate regional engineer is the one serving the area in which the car building plant is located. For plan review purposes, one set of plans will suffice.

Plan review reports will be sent to the carrier, the builder (if other than the carrier), and to the appropriate field personnel of the Public Health Service. However, because the details of all items relating to sanitation equipment and facilities are not always complete, and since unforeseen circumstances sometimes require changes during construction, provisions are made for inspection of cars while under construction or reconstruction. Inspections of cars under construction or reconstruction will be made by a representative of the Public Health Service regional engineer having jurisdiction over the area in which the shops or plants doing the work are located. Carriers and builders should avail themselves of consultative and early inspectional services of the Public Health Service in order to prevent the building in of sanitary defects which might require costly changes. A qualified carrier representative should, whenever practicable, accompany the Public Health Service representative on inspections of cars in order for the carrier to have a clear understanding of any unsatisfactory features that may be noted during the inspection.

A Certificate of Sanitary Construction will be issued for each new or reconstructed car found, upon inspection, to conform to the construction standards of the Public Health Service. It is believed that builders will find it advantageous to request the Public Health Service to issue the certificate because it will indicate to the carriers that construction is satisfactory from a public health standpoint.

Section I. GENERAL STANDARDS APPLYING TO ALL TYPES OF RAILROAD PASSENGER CARS

1. WATER SUPPLY FACILITIES. *a.* All water distribution pipes and tubing should be of an impervious, nontoxic material. Ferrous pipe and fittings should be galvanized to prevent rusting. Plastic pipe and fittings must meet the requirements of the Public Health Service.

b. The water system, whether pressure or gravity type, should be closed from the car-filling connection to the discharge taps. However, vent openings will be permitted wherever necessary if they are protected from contamination.

c. Car-filling connections through which potable water tanks are filled should be provided on both sides of each car for each type of water system. Such connections should be so located and protected as to minimize the hazard of their contamination by toilet hopper discharges, roadbed dust and dirt, etc.

(1) The car-filling connection should be constructed so as to permit a direct and tight connection with the water hose nozzle. Only one type of water-filling connection should be provided on any one car; except that on cars which carry both gravity and pressure water systems, one type of connection for each type of system may be provided if such connections are provided on both sides of the car.

(2) If a male-type, car-filling connection is used, it should be completely enclosed in a metal receptacle with a spring-loaded or self-closing cover for protection against contamination. The receptacle should be so constructed that pooling of water within the receptacle cannot take place.

(3) If a female-type, car-filling connection is used, it should have an overlapping spring-loaded or self-closing cover on the end, or should be otherwise enclosed for protection against contamination.

d. All plumbing fixtures should be installed so that they, and the immediate areas around them, can be easily cleaned. All piping to plumbing fixtures should be either enclosed or located above the floor at a distance which permits thorough cleaning.

e. Water storage tanks should be designed so they can be sterilized and flushed, and they should be equipped with a drain which permits complete drainage of the tank.

f. Strainers, if provided, should be of the removable, perforated-metal type and should be easily accessible.

g. Since water must be safe in quality and handled in a sanitary manner before it can be considered acceptable for use, filters are not necessary. A hazard to an otherwise safe supply of water on the car might be introduced if the units are contaminated during servicing. If filters are provided, they should be of the removable type and should be (1) constructed so they can be cleaned and sterilized, or (2) constructed so they can be replaced with sterilized units.

h. Water coolers should be an integral part of the water system. The water compartment should consist of an enlarged pipe, coil, pan, or tank. The cooler should be of durable, rust-resistant material, and so constructed as to prevent the refrigerant from coming into contact with the potable water. If ice is to be used as the refrigerant, the ice compartment should be reinforced and should be provided with a separate drain. Water coolers in which the ice is in direct contact with the drinking water are entirely unsatisfactory. Dispensers for single-service drinking cups and receptacles for the used cups should be installed adjacent to the water coolers, unless the coolers are equipped with fountains or the water is used only for table or counter service. Removable water coolers are acceptable only where there is no other water system on the car; e.g., cars on some commuting trains. Inverted bottle water coolers or dispensers which utilize fixed dispensing devices are not acceptable.

i. All parts of car water systems, including tanks and the distribution system, should be sterilized with chlorine or steam before cars are placed in operation. If chlorine is used in the sterilization of the potable water system, the following instructions should be utilized:

(1) Flush the tank and distribution system with potable water.

(2) Determine the volume of water necessary to fill the tanks and distribution system completely. The amount of disinfecting agent required may be determined from the following table. When the capacity of the system or the concentration of chlorine in the compound is different from those listed in the table, the amount of disinfecting agent for a 50-p.p.m. solution can be computed by—

$$\text{Ounces of chlorine compound} = \frac{\text{Capacity of water system in gallons}}{1.5 \times \text{percent chlorine in compound}}$$

TABLE I.—*Amount of chlorine compound required for a 50-p.p.m. solution.*

Capacity of system		Ounces of chlorine compound			
Gallons	Pounds	Chlorinated lime (25 percent)	High-test calcium hypochlorite (70 percent)	Liquid sodium hypochlorite	
				(5 percent)	(10 percent)
50	417	1.3	0.5	6.7	3.3
75	626	2.0	0.7	10.0	5.0
100	834	2.7	1.0	13.3	6.7
125	1,043	3.3	1.2	16.7	8.3
150	1,251	4.0	1.4	20.0	10.0
175	1,460	4.7	1.7	23.3	11.7
200	1,668	5.3	1.9	26.7	13.3
250	2,085	6.7	2.4	33.3	16.7

NOTE.—A heaping tablespoon holds approximately ½ ounce; a measuring cup approximately 6 ounces of the dry chemical.

(3) Prepare the chlorine solution as follows:

(*a*) *Chlorinated lime:* Place the proper amount of chlorine compound in a clean, dry bucket. Add a small amount of water and mix to a thick paste. Dilute the paste by adding water gradually and stirring constantly until the chemical goes into solution. (Warm water is better than cold water for this purpose.) Allow the solution to stand for 30 minutes, so that the undissolved particles may settle to the bottom. Pour off the clear liquid (which is the chlorine solution) and, if necessary, filter it through muslin or cheesecloth.

(*b*) *High-test hypochlorite:* Place the proper amount in a bucket, fill with water, and stir until the powder is dissolved, (disregard slight turbidity, if any).

(*c*) *Liquid sodium hypochlorite:* These solutions require no additional preparation.

(4) Introduce the chlorine solution into the potable-water tank.

(5) Immediately after introducing the chlorine solution, the tank should be completely filled with water. Sufficient mixing usually will be obtained by swirling action of the incoming water.

(6) Open each tap on the distribution system and allow the water to flow until chlorinated water appears. Since a certain amount of the chlorinated water will have been drawn from the storage tank, it should be refilled to overflowing and chlorine solution should be added, if necessary, to obtain at least a 50-p.p.m. dose in the tank.

(7) After the tank and the piping system have been filled, the chlorinated water should be allowed to stand in them for at least 4 hours before it is discharged. (In an emergency, the contact time may be shortened to 1 hour by increasing the dosage to 100 p.p.m.)

(8) After this contact period, the tank and distribution system should be drained and then flushed with potable water until the chlorine taste is not objectionable.

2. TOILET AND LAVATORY FACILITIES. *a.* Toilet hoppers should be designed to prevent accumulation of fecal matter on the sides of the bowl. Water-flushed toilet hopper valves should be constructed to deliver an ample volume of water at a rate which will thoroughly flush the fixture at each operation. In pressure-or gravity-type water systems, a backflow preventer (vacuum breaker) should be provided for each hopper; however, when the water system is gravity type and the air inlet to the vent is located higher than every water discharge outlet of the system, the vacuum breaker may be omitted. The backflow preventer should be located on the discharge side of the hopper valve, with the bottom of the backflow preventer at least 4 inches above the flood level or overflow rim of the hopper. Toilets of the dry-hopper type are acceptable only on cars, such as commuting cars, which have no water systems. A toilet-paper holder should be installed next to each toilet hopper. Doors to toilet rooms should be provided with locks if no other provisions are made to prevent hoppers from being discharged on the ground surfaces in restricted areas.

b. Lavatory facilities (wash basins) should be permanent installations of durable and easily cleanable construction. Folding wash basins are acceptable. Water inlets to each basin should terminate at least 1 inch, or twice the diameter of the inlet, whichever is greater, above the flood level or overflow rim of the basin; otherwise, a properly installed backflow preventer (vacuum breaker) should be provided. A holder or dispenser for soap, and a clean towel receptacle, should be located next to all lavatories or wash basins. A soiled towel receptacle also should be provided, unless another receptacle suitable to receive soiled towels is convenient to the facility.

c. Dental bowls, where provided, should be equipped with backflow preventers (vacuum breakers) unless all water inlets to the bowls terminate at least 1 inch, or twice the diameter of the inlet, whichever is greater, above the overflow rim of the fixture.

d. A nonporous material, such as rubber tile, asphalt tile, or linoleum, should be used for the floors of toilet and lavatory rooms. Joints between the floors and side walls should be coved.

3. VENTILATING AND HEATING. All cars should be constructed so they can be provided with an adequate supply of fresh or conditioned air at all times and with adequate heat in cold weather.

Section II. COACHES

The general standards listed in section I apply to the construction of all coaches.

Section III. SLEEPING CARS

The general standards listed in section I apply to the construction of all sleeping cars. The following additional standards also will apply:

1. LINEN LOCKERS. Separate storage spaces, equipped with a door or doors, should be provided for storage of clean linens and soiled linens.

2. DRINKING WATER FACILITIES. Circulating refrigerated water systems are considered more desirable than carafes for supplying drinking water to occupants of bedrooms, drawing rooms, compartments, roomettes, etc. When used for serving drinking water, carafes should be provided with a closure, a top, or a cover which protects the pouring lip from contamination, or should be stored in separate cabinets provided for this purpose. In cars equipped with a circulating ice water system, carafes for emergency use should be stored in a clean, protected space.

Section IV. DORMITORY CARS OR DORMITORY PORTIONS OF COMBINATION CARS

The general standards outlined in section I apply to the construction of all dormitory cars or the dormitory portions of combination cars. The following additional standards also will apply:

1. LINEN LOCKERS. If linen is stored on dormitory cars, separate storage spaces, equipped with a door or doors, should be provided for storage of clean linens and soiled linens.

2. CREW'S CLOTHING LOCKER. If storage lockers for the crew's clothing are provided, they should be properly ventilated.

3. VENTILATION. Special attention should be given to proper ventilating of dormitory spaces.

Section V. LOUNGE, CLUB, AND PARLOR CARS

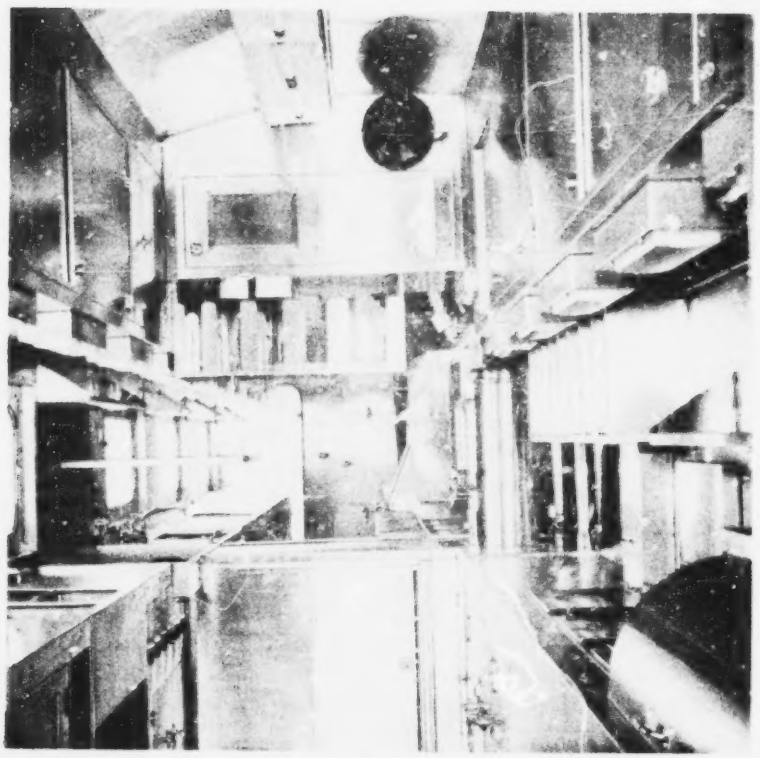
The general standards listed in section I apply to the construction of all lounge, club, and parlor cars.

The standards listed in section VI apply to the construction of the food or drink handling areas of all lounge, club, and parlor cars.

Section VI. DINING CARS AND BAR CARS

The general standards listed in section I apply to the construction of all dining cars and bar cars. In addition, those standards listed in paragraphs (1) through (18) below also apply.

The standards enumerated below apply to all dining cars and the areas in all other cars where food and/or drink are prepared, stored, or served.



Dining car pantry and kitchen.

1. FLOORS. *a.* The floors of all areas in which food or drink is stored or prepared should be smooth, nonporous, and easily cleaned. Floors may be metal, metal covered with linoleum, rubber tile, or some other nonporous substance. Removable floor racks of suitable material and easily cleanable construction may be used. The floors should be sloped to one or more centrally located drains. Drains to the outside of the car should be constructed so as to prevent the infiltration of dust into the car.

b. The floors, except for those areas in which food or drink is prepared or stored or utensils are washed, may be covered with carpet.

c. Openings to spaces that cannot be cleaned easily should be sealed (see item 9*d*). Floor racks, if used, should be so constructed as to be easily removable from the car.

2. WALLS AND CEILINGS. *a.* Walls and ceilings in areas where food or drink is stored or prepared should be smooth, light in color, and washable. Joints should be tight, or seams should be filled and finished to a smooth

surface, to facilitate cleaning and to prevent infestation by or harborage for insects.

b. Spaces between pieces of equipment, or between a piece of equipment and a wall, should be enclosed unless they can be easily cleaned.

c. All exposed joints between equipment and the floor, equipment and the walls, or the walls and the floor, should be rounded with not less than ¼-inch radius.

3. DOORS AND WINDOWS. Windows and doors of cars in which food or drink is stored, prepared, or served should be constructed so as to be reasonably dusttight. Windows should be sealed or so constructed as to permit the installation of screens with not less than 16-mesh wire.

4. LIGHTING. *a.* In areas where food or drink is prepared, artificial light sources should produce at least 10 foot-candles of light on all working surfaces.

b. At the floor level in all walking areas of kitchens, pantries, and bars, artificial light sources should produce at least 4 foot-candles of light.

c. All refrigerators should be provided with an interior light or lights.

d. In areas where food or drink is served, the intensity of artificial light sources may be determined by the individual carrier.

5. VENTILATION. *a.* All areas where food or drink is prepared or served, or in which utensils are washed, should be kept reasonably free of disagreeable odors, condensation, and excessive heat, through proper ventilation.

b. The following suggestions are offered for consideration in planning the ventilation and heat control of areas where food and drinks are prepared:

(1) An abundant supply of filtered air may be necessary for ventilating the kitchen and pantry areas effectively. If outside air is added, a heating device, preferably thermostatically controlled, should be provided for warming the air during the winter months.

(2) Since the range is the major source of heat in the kitchen, an air exhaust should be located above or behind the range.

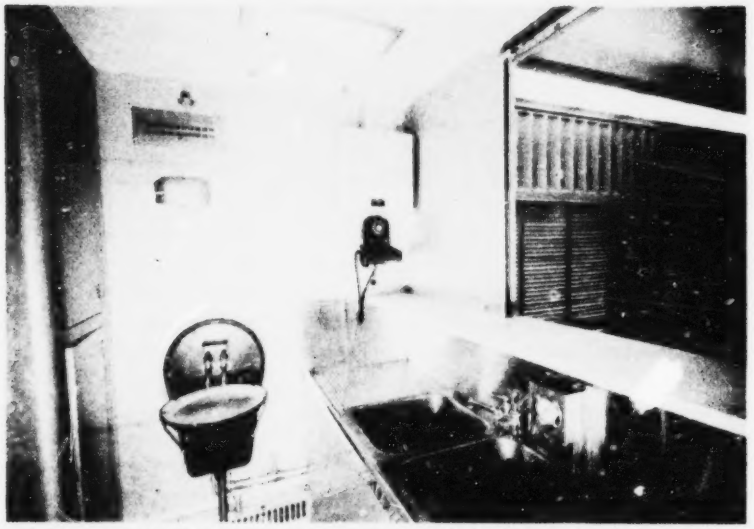
(3) The broiler should be covered and, wherever possible, the range, broiler, and other heat sources, such as smokestacks, hot water pipes, etc., should be properly insulated. In a reconstruction job where the cooking equipment is uninsulated and is not to be replaced, it is recommended that insulating shields be placed at the oven, fire box, charcoal broiler, and any other source of intense heat, and that the shields be constructed so as to permit easy cleaning.

6. TOILET FACILITIES. Toilet facilities for the exclusive use of food or drink handling crews are not required. However, toilet facilities available to these crews are to be provided and should be convenient to the food or drink service area on the train.

7. WATER. *a.* Hot water (minimum 100° F.) and cold water shall be piped to all areas in which food or drink is prepared or utensils washed.

Water storage facilities should be large enough to provide a quantity of water adequate for proper cleaning of equipment and utensils.

b. To prevent back siphonage of contaminated water, all water inlets to sinks, wash basins, steam tables, etc., should terminate at least 1 inch, or twice the diameter of the inlet, whichever is greater, above the overflow rim of the fixture; or a backflow preventer (vacuum breaker) should be installed on the outlet side of the water control valve, with the bottom of the backflow preventer at least four inches above the overflow rim of the fixture. However, if the water system is gravity type, and the air inlet to the vent is located higher than every water discharge outlet of the system, the vacuum breaker may be omitted.



Handwashing facilities and two-compartment sink with indicating thermometer.

8. HANDWASHING FACILITIES. *a.* Handwashing facilities for the exclusive use of dining car employees should be provided in the food preparation areas of each car on which food or drink is prepared or served. The facilities should be located where they are readily available to food service personnel at all times. Where a permanent or semipermanent partition is provided between the kitchen and pantry of a dining car, lavatories should be provided in both areas. The use of a folddown serving board between the kitchen and the pantry will not be interpreted as constituting a permanent or semipermanent partition.

b. Handwashing facilities for the exclusive use of bar employees are not required in the bar section of cars on which drink only is prepared and

served, if handwashing facilities are accessible to these employees elsewhere on the car.

c. Handwashing facilities should include the following: (1) Wash basin of fixed or folding type, (2) hot and cold running water, or warm running water, (3) soap holder or dispenser, (4) clean towel dispenser, and (5) soiled towel receptacle, or other suitable receptacle. Durable, legible signs directing dining car employees to wash their hands after each use of the toilet should be posted in the kitchen and pantry where they can be seen readily. Such signs may be stenciled on the walls.

9. CONSTRUCTION OF EQUIPMENT. *a.* All multiuse utensils and equipment shall be so constructed as to be easily cleaned and shall be kept in good repair. Food contact surfaces should be accessible for cleaning, self-draining, smooth, nontoxic, corrosion-resistant material, and shall be kept free of breaks, corrosion, open seams, cracks, and chipped places. Utensils containing, or plated with, cadmium, antimony, zinc, or lead shall not be used; however, solder containing not more than 5 percent lead may be used for jointing. The use of any type of equipment which normally permits food or drink to come in contact with V-type threaded surfaces is unsatisfactory.

Joints and seams in equipment and between various units of equipment should be smooth, easily cleanable, and without cracks or crevices. Unnecessary ledges should be eliminated. All internal corners in equipment should be rounded with a minimum radius of one-fourth inch, and edges should be finished smooth. Gaskets should be of nonabsorbent material, and kept in good repair.

Where possible, equipment appearing on the "List of Acceptable Interstate Carrier Equipment Having Sanitation Significance" should be used.

b. All compartments with lids should be designed with a collar or breaker strip which will prevent seepage into the compartment. Recessed or flush-type handles, if used on lids, should be constructed so as to be easily cleaned, and to prevent pooling of liquids within the recess.

c. Water-glass filling devices should be so constructed and located as to prevent contamination of adjacent areas by water which has overflowed the glass and spilled over the hands of employees, or splashed from the drain tray. A drain from the unit should be provided.

d. The minimum clearance between the floor and the undersurface of equipment should be at least 6 inches, unless these spaces are completely enclosed. Toe space under the front surface of equipment is satisfactory.

10. EQUIPMENT FOR CLEANING AND BACTERICIDAL TREATMENT OF UTENSILS. *a.* Both kitchens and pantries of food or beverage service cars should be equipped with two-compartment sinks if hot water is used as the bactericidal agent; or equipped with three-compartment sinks if chemicals are used as the bactericidal agent. One of the compartments should be of sufficient size and depth to permit the complete immersion of a basket

of utensils during the bactericidal treatment (see par. *b*, below). In the pantry, a dishwashing machine may be substituted for the two-compartment sink. In the kitchen, a dishwashing machine may be installed only if it is in addition to the sinks.

b. The bactericidal treatment compartment of all sinks should have an effective depth 3 inches greater than the diameter of the largest dish or utensil to be treated. The compartment should also have at least 4 additional inches of free board depth, and an antisplash rim for the protection of employees. For plates 12 inches in diameter, for example, a bactericidal treatment compartment should have a liquid depth of 15 inches, while the minimum overall depth to the top of antisplash rim would be 19 inches.

c. Where a two-compartment sink is installed, the bactericidal treatment compartment should be provided with a thermometer which is accurate to within 2° F., and on which the scale divisions are not more than 2° F. Provision should be made for maintaining the water in the treatment compartment at or above 170° F. Long-handled wire baskets are essential when the hot water method of bactericidal treatment is employed.

d. Where a three-compartment sink is installed, either hot water bactericidal treatment or chemical bactericidal treatment may be used. Long-handled wire baskets, while not required for chemical bactericidal treatment, are desirable in the interest of efficient operations.

e. Dishwashing machines, if used, should be so designed, installed, operated, and maintained that the utensils are rendered free of visible soil, wash water, and detergent, leaving them clean, reasonably dry, and free of microorganisms which present a potential health hazard.

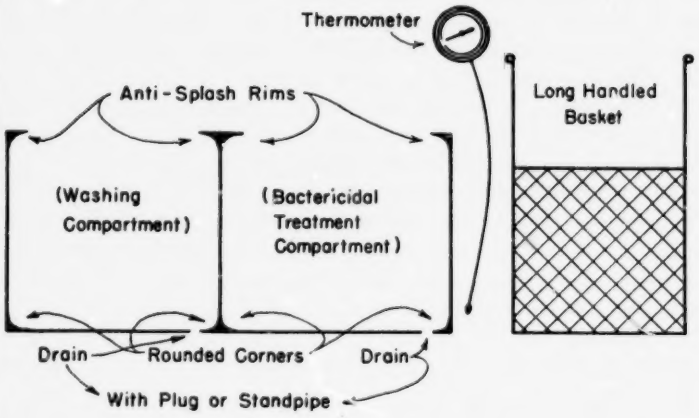
Scraping facilities should be provided for removing food particles from utensils. Prerinsing facilities are desirable; these, if provided, should maintain the wash water in a cleaner condition, thereby enhancing the effectiveness of the dishwashing machine.

The effectiveness of a spray-type dishwashing machine is contingent upon several factors. Some of these are inherent in its design and fabrication, while others depend upon the provision of satisfactory appurtenant equipment and proper operation and maintenance. Among the factors to be considered are the temperature and volume of the applied wash and rinse waters; the type and concentration of detergent used; the cleanliness and maintenance of the machine (which, in turn, are related to its durability and ease of cleaning); the duration of wash and rinse periods; the spray pattern; and the nozzle sizes and operating pressures.

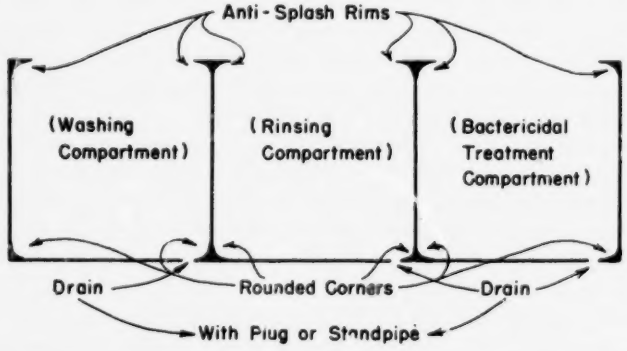
In view of the above, the dishwashing machine should be designed and fabricated of durable materials which will withstand corrosion and be easily cleanable. Also, it should have inherent design features (such as duration of wash and rinse sprays, spray pattern, quantity, pressures, and control devices) which will assure a satisfactory dishwashing operation under proper installation, operation, and maintenance. This requires: (*a*) Provision for

FACILITIES FOR HAND DISHWASHING

WHEN HOT WATER IS THE BACTERICIDAL AGENT



WHEN A CHEMICAL IS THE BACTERICIDAL AGENT



maintaining the wash water in the machine in the temperature range of 140° to 160° F. The detergent concentration should be maintained, preferably, by an automatic dispenser, or alternately, by a definite system of manual feeding, such as spreading a predetermined quantity of detergent over each rack of utensils.

(*b*) Provision of an adequate water supply for the dishwashing operation, with a dependable pressure-regulating device (flow-control or pressure-reducing valves) if required, to maintain 15 to 30 pounds of flow pressure on the final-rinse line at the machine, and not less than 10 pounds per square inch at the rinse nozzles.

(*c*) Provision of adequate water-heating facilities, with dependable thermostatic control, to maintain a temperature of 180° F. or more in the final fresh-water-rinse line at the entrance of the rinse manifold on the machine. The minimum time of rinsing shall be 10 seconds.

(*d*) Provision of an easily readable thermometer on the final and recirculated rinse-water lines near the entrance to the spray arm or manifold. The installation of suitable indicating thermometers on all tanks of dishwashing machines is desirable, to facilitate correct operation.

(*e*) Provision of sufficient racks and clean-utensil-storage area to permit air drying (usually about 45 seconds) before removal of utensils from racks following washing.

NOTE.—More detailed specifications for the various types of dishwashing machines may be found in Standard No. 3, *Spray-Type Dishwashing Machines,* adopted by the Joint Committee on Food Equipment Standards and published by the National Sanitation Foundation, Ann Arbor, Mich. (May 1953). Equipment manufactured in conformity with Standard No. 3 will be considered as complying with the sanitary design and construction standards of this manual.

11. EQUIPMENT FOR STORING AND HANDLING UTENSILS AND NONPERISHABLE FOODS. *a.* Storage spaces for all containers, utensils, and nonperishable foods should be provided at a distance sufficiently above the floor to insure a clean, dry place and protection from splash, dust, overhead leakage, condensation, and other contamination.

b. Shelves should be of noncorrodible material and of easily cleanable construction. Removable rubber, corrugated metal, or other nonporous mats on shelf surfaces are acceptable. Shelves should be so constructed as to be removable or, if not removable, should have sealed joints or be bracketed in such a manner as to leave a cleanable space between the shelf edges and the walls of the storage space.

c. The interiors of cabinets and storage drawers (including silver drawers) should be of easily cleanable construction. Fixed felt or other porous linings are not acceptable.

d. Knife racks should be removable and easily cleaned.

e. Tray racks should be removable or open at the bottom for easy cleaning.

f. If bulk ice cream is to be served, a dipper well (with running water) or other acceptable facilities should be provided for storing the dispenser.

g. Sliding doors on cabinets, food warmers, etc., should be demountable for easy cleaning.

12. EQUIPMENT FOR DISPOSAL OF WASTES FROM FOOD AND DRINK. *a*. Refuse containers should be watertight, nonabsorbent, easily cleaned, and equipped with close-fitting covers.

b. Refuse chutes should be constructed so as to be easily cleaned and so as to prevent material from falling outside of the receiving container.

c. If a fixed compartment is provided for garbage, the interior should be accessible for easy cleaning and should be constructed so that it can be emptied only from the outside of the car. It should also be protected against freezing.

d. If garbage grinders are used without retention tanks or devices which prevent the use of grinders when cars are in stations or servicing areas, the grinder outlets should be constructed and located so that cans or containers may be placed beneath them.

e. In addition to the customary glass or dishwashing sink in the pantries and bars, it is suggested but not required that a small waste sink be provided into which may be emptied the contents from glasses returned from dining rooms and lounges.

13. REFRIGERATION. *a*. Refrigerators for the storage of perishable foods should be capable of maintaining a temperature at or below 50° F. at all times.

b. An indicating thermometer should be provided to indicate the temperature in the warmest zone of each refrigerator, and should be placed where it can be read with ease. The thermometer should indicate the temperature in degrees Fahrenheit. The smallest scale division should be not more than 2° F., and the thermometer should be accurate within 2° F. plus or minus. Thermometers need not be installed on deep-freeze refrigerators.

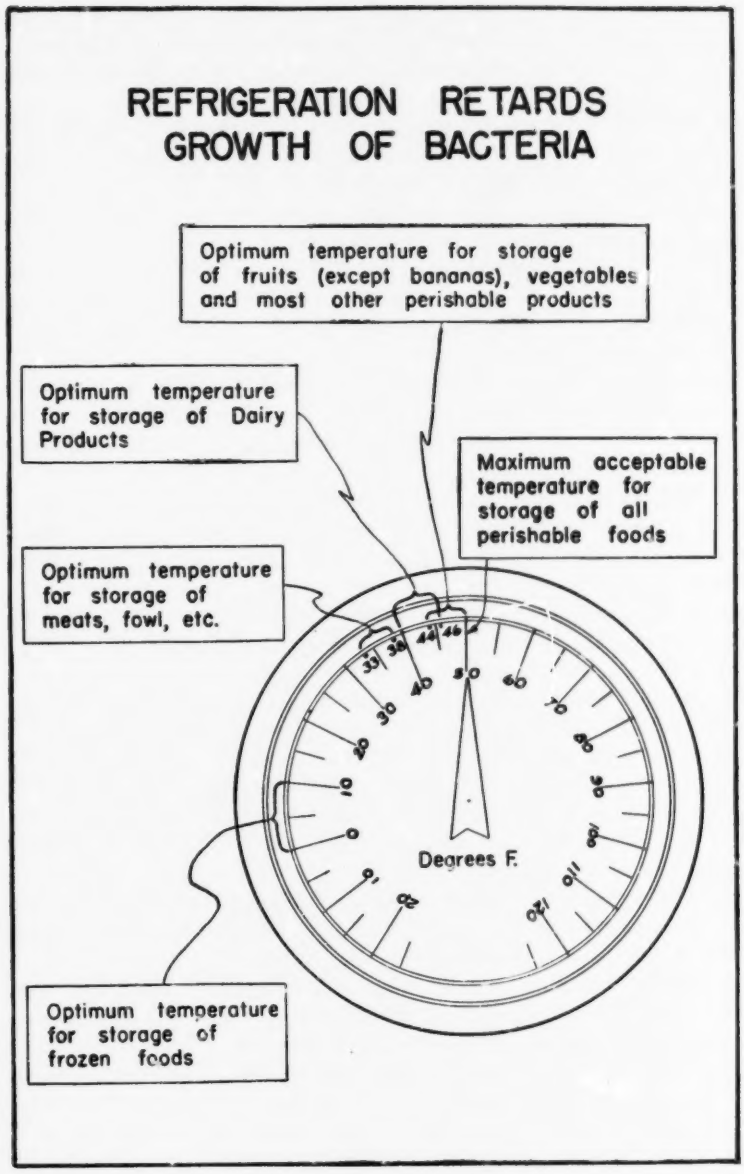
c. The interior of refrigerators should be illuminated to facilitate cleaning.

d. Interior surfaces of a refrigerator should be smooth, nonabsorbent, easily cleaned, and light colored.

e. When drains from ice refrigerators are designed to empty directly to the outside of the car, they should be provided with dust caps or traps containing a water seal for keeping the refrigerators free of road dust. Drains from mechanical or dry ice refrigerators are desirable to facilitate cleaning, but are not required. If provided, they should empty onto the floor of the kitchen, pantry, or bar.

f. Carbon dioxide from dry-ice refrigerators should be vented to the outside of the car, except in the case of small, portable coolers.

14. WHOLESOMENESS OF FOOD AND DRINK. This item is not applicable to this handbook, but it is inserted here to keep the numbering system


REFRIGERATION RETARDS GROWTH OF BACTERIA
Optimum temperature for storage of fruits (except bananas), vegetables and most other perishable products
Optimum temperature for storage of Dairy Products
Maximum acceptable temperature for storage of all perishable foods
Optimum temperature for storage of meats, fowl, etc.
Degrees F.
Optimum temperature for storage of frozen foods

for this handbook consistent with that followed in the handbook on "Dining Cars in Operation."

15. STORAGE, PREPARATION, AND DISPLAY OF FOOD AND DRINK. *a.* Areas and equipment used for storing, preparing, and displaying food or drink should be constructed and located so as to provide protection from contamination for such food or drink.

b. Unless ice is manufactured on the car, a separate sink or compartment should be provided for storing and washing ice that will come in contact with food and drink. Such sink or compartment should be provided with running water and a drain. To prevent contamination of the ice sink with possible backflow, the drain shall not be connected with the drains from other equipment and, if designed to empty directly to the outside of the car, shall be provided with dust caps or traps containing a water seal for keeping the sink free of road dust. The spigot used for filling pitchers, drinking glasses, and/or other containers should not be located over or adjacent to the ice well unless effective shielding is provided to prevent contamination of the ice with spillage, drippings, splash, or spray. The opening at the top of the compartment should be at least equal in area to the largest horizontal cross-sectional area of the compartment. An ice scoop or tongs should be provided at the ice well. A hook, or a tapered receptacle open at the bottom and located outside the ice compartment, is suggested as a storage place for the ice scoop.

c. The dining car should be constructed and maintained so that rodents cannot enter it under normal conditions.

16. EMPLOYEE CLEANLINESS. *a.* Handwashing signs should be posted or stenciled in the kitchens and pantries of all food or beverage service cars.

b. Clothing lockers, if provided, should be well ventilated and should not open into the kitchen or pantry area.

17. MISCELLANEOUS. *a.* Separate storage spaces equipped with a door or doors should be provided for storage of clean linen and soiled linen.

b. Provision of space for storage of bedding or other materials unrelated to food preparation areas of dining cars is not acceptable.

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